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basic to the most acidic in composition, and from late Cambrian to pre-Devonian in age. These igneous rocks probably take the form of thick laccoliths, and the different rock varieties are arranged in the order of decreasing basicity. In many cases erosion has removed the acidic members of the series. Serpentine itself is the least abundant rock of the area, but the most important economically.

Thirty-four mineral species are described from the area. In many cases their origin is given, especially the alumino-silicates rich in lime such as diopside, vesuvianite, and grossularite, which occur as dikes in the peridotite and are not the products of contact metamorphism. The CaO content for these minerals is thought to have been extracted by magmatic waters from the already consolidated portions of the igneous mass. Microscopic diamond crystals were found in the chromite, which is further evidence of the primary origin of chromite. Eleven new forms of diopside are recorded, with a number of illustrative drawings. Colerainite, $H_5Mg_2AlSiO_8$, is a new mineral species found in Coleraine Township, and its physical properties are described in detail with a number of chemical analyses. The mode of origin of the various varieties of serpentine is described with chemical analyses. Good views of the pits and microphotographs are given.

J. F. W.

Report on Braxton and Clay Counties. By RAY V. HENNER. West Virginia Geological Survey, 1917. Pp. 883, pls. 29, figs. 16.

A report on the mineral resources of the area with a discussion of its general geology. Aside from soils the principal wealth of the two counties is in the oil and gas pools, building-stone, and clay and shale for brick. The report is accompanied by topographic and geologic maps.

Part I considers briefly the physiography and history of the development of the region. The counties are in the central part of the state, on the eastern flank of the Appalachian geosyncline. Their present topography is that of a deeply dissected plateau.

Part II is an account of the general geology. The structure is simple, consisting of a gentle dip to the northwest, interrupted by gentle folds. The stratigraphic range is from the upper Devonian through the Paleozoic. Some Pleistocene river terrace deposits are present. A detailed description accompanied by sections is given for each formation present.

Part III discusses the mineral resources, the chief of which are oil and gas. Their development is of recent date. But few wells have been driven into the Chemung, and none below it, the present, known producing horizons being limited to the Pennsylvanian and Mississippian. Coal-mining operations, while on a large scale, are insignificant when compared to those of other counties of the state. The author estimates that the total available tonnage that may eventually be recovered is about 4,440,000,000. While there is not a single brick or pottery plant utilizing clays within the counties, there is an almost inexhaustible supply of raw materials as well as cheap fuel. Sandstone for road macadam and building purposes is abundant. In Clay County about half of the land is unfit for agricultural purposes, and it is suggested that this land be reforested.

Part IV consists of several paleontological contributions. W. A. Pierce presents some notes on the fossils of the Winefred limestone and Uffington shale in which he notes the absence of a marine fauna. Professor E. C. Case describes the leg bone of a pareiasaurus-like reptile found in the Conemaugh series. I. C. White gives a few notes on the Conemaugh and Permian of the region, and comes to the conclusion that "not only the reptilian life, but also the plant and insect life of the Conemaugh series supports the conclusion that the beginning of red sediments in the Conemaugh marks the dawn of Permian time while there is nothing in the marine life of the epoch to contradict the same when properly interpreted.

Attached to the report is an appendix giving the elevations above mean tide for the area.

A. C. McF.

The Mackenzie River Basin. By CHARLES CAMSELL and WYATT MALCOLM. Canadian Geological Survey, Memoir 108, 1919. Pp. 154, pls. 14, fig. 1, and map.

This is a compilation of what is known concerning the geology of the Mackenzie River basin, which is about 1,350 miles long and 100 miles wide at the mouth of the river and 900 miles wide near the center, with a total area of about 682,000 square miles.

Parts of three chief physiographic provinces are included in this area and each one runs almost the whole length of the basin. They are the Laurentian Plateau on the east, the Great Central Plain of North America in the center, and the Cordilleran region on the west.